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No. 23 was also observed at Copenhagen ($356^{\circ} + 30^{\circ} + \rightarrow$
 $341^{\circ} + 18^{\circ}$, 1 Magnitude).

No. 28 was also observed at Copenhagen ($290^{\circ} + 57^{\circ} + \rightarrow$
 $273^{\circ} + 42^{\circ}$, 2).

No. 77 was also observed at Copenhagen ($248^{\circ} + 40^{\circ} + \rightarrow$
 $254^{\circ} + 27^{\circ}$, 1 Magnitude).

These three meteors give the following results:—

No.	Beginning.			End.			Real Length of the Path.
	h	λ	ϕ	h	λ	ϕ	
		° /	° /		° /	° /	
23				120	1 23 East.	54 54	Km.
28				98	0 57 West.	55 32	
77	107	1 17 West.	55 43	101	1 27 West.	55 25	

Odder is situated in $2^{\circ} 25'$ W. longitude from Copenhagen, and $55^{\circ} 58'$ N. latitude. h and β indicate kilometres; λ is longitude from Copenhagen; ϕ is N. latitude.

NOTE.—This paper was accompanied by a drawing of five phases of the occultation of *Jupiter* by the Moon on 1896, June 14.. The drawing is not reproduced here. The radius of *Jupiter* is taken as 9 mm. 2.5 mm. were obscured at $10^h 42^m 50^s$; 8.3 mm. at $10^h 43^m 10^s$; 14 mm. at $10^h 43^m 30^s$. The middle time is that of bisection, according to a late note from Mr. KÖHL.

THE COMMITTEE ON PUBLICATION.

PLANETARY PHENOMENA FOR MAY AND JUNE, 1897.

BY PROFESSOR MALCOLM MCNEILL.

MAY.

Mercury is an evening star until May 20th, when it comes to inferior conjunction with the Sun. It passed greatest east elongation on April 28th, and during the first ten days of the month is in very good position for observation, not setting until nearly two hours after sunset on May 1st.

Venus is now a morning star, having passed inferior conjunction on April 28th. It is too near the Sun to be seen during the early part of the month, but its distance rapidly increases, and after May 10th it rises more than an hour before sunrise. On May 1st, there is a very close conjunction of the Sun, Moon and *Venus*; the Moon passes the planet at about 3 A. M., and the Sun at 1 P. M. Of course, both Moon and planet are too near the Sun to be seen.

Mars is still in the southwestern sky in the evening, but sets an hour earlier than for the corresponding period in April, at a little after 11 P. M. on May 30th. It moves about eighteen degrees east and four degrees south during the month from the constellation *Gemini* into *Cancer*. On the morning of May 25th, it passes just south of the fifth magnitude star η *Cancr*i, the nearest distance being only two minutes, but this is while they are below our horizon. During the closing days of the month it passes through the "Beehive" cluster in *Cancer*. The planet has nearly reached its maximum distance from the Earth, and it will not diminish very greatly in brightness before reaching its minimum. It passes aphelion on the night of May 21st.

Jupiter is also in the southwestern sky in the evening, setting after midnight. It is in the constellation *Leo*, and during the month it moves about two degrees east and forty minutes south. At the beginning of the month it is about two degrees east of the first magnitude star *Regulus* (α *Leonis*).

Saturn rises at about sunset in the middle of the month, coming to opposition on the night of May 17th. It moves west in the constellation *Libra* about two degrees during the month. At the beginning of the month it is about three degrees west of the third magnitude star β *Scorpii*.

Uranus is quite close to *Saturn*, about two degrees south. It comes to opposition on the same date as *Saturn*, May 17th, but about twelve hours earlier. Its motion is like that of *Saturn*, but only about half as great.

Neptune is in the eastern part of the constellation *Taurus*, too close to the Sun for observation.

JUNE.

The Sun attains its maximum declination at the summer solstice, and summer begins June 20th, 8 P. M., P. S. T.

Mercury is a morning star, and reaches greatest west elongation on June 15th. It is several degrees south of the Sun, and

the conditions are not very good for visibility ; but after June 10th it rises at least an hour before the Sun, and it may possibly be seen if the atmospheric conditions are very favorable.

Venus is also a morning star, and is rapidly increasing its distance from the Sun, so that by the end of the month it has nearly reached greatest west elongation. It reaches its maximum brightness early in the month, and during most of the month it can be seen in full sunlight without telescopic aid.

Mars sets about an hour earlier than during May, at about 10 P. M. on June 30th. It moves about seventeen degrees east and six degrees south during the month, through the constellation *Cancer* toward *Leo*, and at the end of the month is only about two degrees west and north of *Regulus* (α *Leonis*). Its actual distance from the Earth is about twice the mean distance of the Earth from the Sun, and its brightness not far from its minimum.

Jupiter is somewhat to the east and south of *Mars*, and moves about four degrees east and two degrees south during June, in the constellation *Leo*, away from *Regulus*. At the end of the month it is ten degrees east and four degrees north of *Mars*, *Regulus* lying between the planets and nearer *Mars*.

Saturn is now well above the horizon at sunset. It moves about two degrees west in the eastern part of the constellation *Libra* away from β *Scorpii*. The apparent minor axis of the ring is four-tenths that of the major.

Uranus is just about two degrees south of *Saturn*, and moving in the same direction, but more slowly. It is in conjunction with *Saturn* on June 8th.

Neptune is a morning star, quite close to the Sun.

EXPLANATION OF THE TABLES.

The phases of the Moon are given in Pacific Standard time. In the tables for Sun and planets, the second and third columns give the Right Ascension and Declination for Greenwich noon. The fifth column gives the local mean time for transit over the Greenwich meridian. To find the local mean time of transit for any other meridian, the time given in the table must be corrected by adding or subtracting the change per day, multiplied by the fraction whose numerator is the longitude from Greenwich in hours, and whose denominator is 24. This correction is seldom much more than 1^m. To find the standard time for the

phenomenon, correct the local mean time by *adding* the difference between standard and local time if the place is west of the standard meridian, and *subtracting* if east. The same rules apply to the fourth and sixth columns, which give the local mean times of rising and setting for the meridian of Greenwich. They are roughly computed for Lat. 40° , with the noon Declination and time of meridian transit, and are intended as only a rough guide. They may be in error by a minute or two for the given latitude, and for latitudes differing much from 40° they may be several minutes out.

PHASES OF THE MOON, P. S. T.

			H.	M.	
New Moon,	May	1,	12	46	P. M.
First Quarter,	May	9,	1	37	P. M.
Full Moon,	May	16,	5	54	A. M.
Last Quarter,	May	23,	1	34	A. M.
New Moon,	May	31,	4	26	A. M.

THE SUN.

1897.	R. A.	Declination.	Rises.	Transits.	Sets.
	H. M.	° '	H. M.	H. M.	H. M.
May 1.	2 36	+ 15 15	5 4 A. M.	11 57 A. M.	6 50 P. M.
11.	3 14	+ 18 1	4 53	11 56	6 59
21.	3 54	+ 20 18	4 44	11 56	7 8
31.	4 34	+ 22 0	4 38	11 57	7 16

MERCURY.

May 1.	3 55	+ 23 5	5 54 A. M.	1 17 P. M.	8 40 P. M.
11.	4 9	+ 22 21	5 30	12 51	8 12
21.	3 54	+ 18 51	4 49	11 56 A. M.	7 3
31.	3 39	+ 15 46	4 7	11 2	5 57

VENUS.

May 1.	2 12	+ 18 12	4 29 A. M.	11 33 A. M.	6 37 P. M.
11.	1 56	+ 14 18	3 49	10 38	5 27
21.	1 54	+ 11 45	3 16	9 56	4 36
31.	2 5	+ 11 1	2 50	9 28	4 6

MARS.

May 1.	7 30	+ 23 37	9 25 A. M.	4 51 P. M.	12 17 A. M.
11.	7 54	+ 22 35	9 14	4 35	11 56 P. M.
21.	8 17	+ 21 19	9 3	4 19	11 35
31.	8 41	+ 19 51	8 54	4 4	11 14

JUPITER.

May 1.	10 11	+ 12 33	12 48 P. M.	7 31 P. M.	2 14 A. M.
11.	10 12	+ 12 25	12 10	6 53	1 36
21.	10 15	+ 12 11	11 34 A. M.	6 16	12 58
31.	10 18	+ 11 51	10 59	5 40	12 21

*Publications of the**SATURN.*

1897.	R. A.	Declination.	Rises.	Transits.	Sets.
	H. M.	° '	H. M.	H. M.	H. M.
May 1.	15 48	— 17 39	8 12 P. M.	1 11 A. M.	6 10 A. M.
11.	15 45	— 17 30	7 30	12 29	5 28
21.	15 42	— 17 20	6 42	11 42 P. M.	4 42
31.	15 39	— 17 11	6 0	11 0	4 0

URANUS.

May 1.	15 42	— 19 26	8 14 P. M.	1 5 A. M.	5 56 A. M.
11.	15 40	— 19 20	7 32	12 24	5 16
21.	15 38	— 19 15	6 47	11 39 P. M.	4 31
31.	15 37	— 19 9	6 5	10 58	3 51

NEPTUNE.

May 1.	5 11	+ 21 37	7 15 A. M.	2 32 P. M.	9 49 P. M.
11.	5 12	+ 21 39	6 37	1 54	9 11
21.	5 14	+ 21 41	5 59	1 16	8 33
31.	5 15	+ 21 43	5 20	12 38	7 56

ECLIPSES OF *JUPITER'S* SATELLITES, P. S. T.

(Phenomena near right-hand limb of planet as seen in an inverting telescope.)

	H. M.		H. M.
III, D, May 1.	10 56 P. M.	II, R, May 9.	10 47 P. M.
III, R, 2.	2 16 A. M.	I, R, 12.	10 8 P. M.
II, R, 2.	8 11 P. M.	I, R, 21.	6 31 P. M.
IV, D, 3.	6 18 P. M.	II, R, 27.	5 14 P. M.
IV, R, 3.	10 21 P. M.	I, R, 28.	8 26 P. M.
I, R, 4.	1 44 A. M.	III, R, 30.	6 12 P. M.
I, R, 5.	8 13 P. M.		

MINIMA OF *ALGOL*.

The Sun is too near the star, and the star too near the horizon, for convenient observation of minima.

PHASES OF THE MOON, P. S. T.

	H. M.
First Quarter, June 7,	11 2 P. M.
Full Moon, June 14,	1 1 P. M.
Last Quarter, June 21,	3 24 P. M.
New Moon, June 29,	6 55 P. M.

THE SUN.

1897.	R. A.	Declination.	Rises.	Transits.	Sets.
	H. M.	° '	H. M.	H. M.	H. M.
June 1.	4 39	+ 22 8	4 38 A. M.	11 58 A. M.	7 18 P. M.
11.	5 20	+ 23 8	4 35	11 59	7 23
21.	6 1	+ 23 27	4 37	12 2 P. M.	7 27
July 1.	6 43	+ 23 5	4 41	12 4	7 27

MERCURY.

1897.	A. R. H. M.	Declination. ° ' "	Rises. H. M.	Transits. H. M.	Sets. H. M.
June 1.	3 38	+ 15 37	4 3 A.M.	10 57 A.M.	5 51 P.M.
11.	3 49	+ 16 4	3 33	10 29	5 25
21.	4 28	+ 19 4	3 21.	10 28	5 35
July 1.	5 34	+ 22 35	3 33	10 54	6 15

VENUS.

June 1.	2 6	+ 11 2	2 47 A.M.	9 25 A.M.	4 3 P.M.
11.	2 28	+ 11 51	2 27	9 8	3 49
21.	2 57	+ 13 32	2 10	8 57	3 44
July 1.	3 31	+ 15 35	1 58	8 52	3 46

MARS.

June 1.	8 43	+ 19 41	8 52 A.M.	4 2 P.M.	11 12 P.M.
11.	9 6	+ 18 0	8 43	3 46	10 49
21.	9 30	+ 16 7	8 34	3 30	10 26
July 1.	9 53	+ 14 4	8 26	3 14	10 2

JUPITER.

June 1.	10 18	+ 11 48	10 56 A.M.	5 36 P.M.	12 16 A.M.
11.	10 22	+ 11 23	10 21	5 1	11 41 P.M.
21.	10 27	+ 10 52	9 49	4 27	11 5
July 1.	10 33	+ 10 18	9 18	3 53	10 28

SATURN.

June 1.	15 39	- 17 10	5 56 P.M.	10 56 P.M.	3 56 A.M.
11.	15 36	- 17 2	5 13	10 14	3 15
21.	15 33	- 16 55	4 31	9 32	2 33
July 1.	15 32	- 16 50	3 49	8 51	1 53

URANUS.

June 1.	15 37	- 19 9	6 2 P.M.	10 54 P.M.	3 46 A.M.
11.	15 35	- 19 3	5 20	10 13	3 6
21.	15 34	- 18 59	4 39	9 32	2 25
July 1.	15 33	- 18 55	3 59	8 52	1 45

NEPTUNE.

June 1.	5 15	+ 21 43	5 17 A.M.	12 35 P.M.	7 53 P.M.
11.	5 17	+ 21 45	4 39	11 57 A.M.	7 15
21.	5 19	+ 21 47	4 1	11 19	6 35
July 1.	5 20	+ 21 48	3 23	10 41	5 59

ECLIPSES OF *JUPITER'S* SATELLITES, P. S. T.

(Phenomena near right-hand limb of planet as seen in an inverting telescope.)

	H. M.		H. M.
II, R, June 3.	7 50 P. M.	I, R, June 13.	6 45 P. M.
I, R,	4. 10 22 P. M.	I, R,	20. 8 41 P. M.
III, D,	6. 6 55 P. M.	II, R,	28. 4 50 P. M.
III, R,	6. 10 11 P. M.	I, R,	29. 5 4 P. M.
II, R,	10. 10 24 P. M.		

MINIMA OF *ALGOL.*

The Sun is too near the star, and the star too near the horizon, for convenient observation of minima.